IN THE CLAIMS

A complete set of claims, showing current status, is presented below.

1. (previously presented) A birefringent interferometer for use with a polarized input light beam, comprising:

a first birefringent element oriented to split the polarized input light beam into a first polarized beam and a second polarized beam having a polarization direction orthogonal to a polarization direction of the first beam;

a second birefringent element oriented to combine the first and second polarized beams into an output beam; and

a polarization sensitive detector unit disposed to detect a selected polarization of the output beam

wherein the first birefringent element is oriented to receive the polarized input light beam along a z-direction, a y-direction is defined perpendicular to the z-direction and at 45° to the polarization direction of the polarized input light, an x-direction is defined orthogonal to both the y-direction and the z-direction, and the first birefringent element has an optical axis lying at a selected angle, θ, relative to the z-direction in the y-z plane defined by the y-direction and the z-direction, the second birefringent element having an optical axis lying at the negative of the selected angle, -θ, relative to the z-direction in the y-z plane defined by the y-direction and the z-direction.

2. (original) A birefringent interferometer as recited in claim 1, further comprising a light source disposed to transmit the polarized input light beam to the first birefringent element.

3. (original) A birefringent interferometer as recited in claim 2, wherein the light source includes a light generator that generates a polarized output as the polarized input light beam.

4. (original) A birefringent interferometer as recited in claim 2, wherein the light source includes a light generator that generates an unpolarized output, the unpolarized output passing through a polarizer to produce the polarized input light beam.

5. (original) A birefringent interferometer as recited in claim 2, wherein the light source includes a broadband light generator.

6. (original) A birefringent interferometer as recited in claim 2, wherein the light source includes a laser.

7. (original) A birefringent interferometer as recited in claim 6, wherein the laser is a tunable laser.

8. (original) A birefringent interferometer as recited in claim 2, further comprising a controller coupled to control operation of the at least one of the light source and the detector unit.

9. (original) A birefringent interferometer as recited in claim 8, wherein the controller includes an analyzer unit coupled to the detector unit to record an output from the detector unit.

10. (original) A birefringent interferometer as recited in claim 8, further comprising an interface unit connected to the controller and couplable to a computer, the controller capable of operating under control instructions received from a computer coupled via the interface unit.

11. (original) A birefringent interferometer as recited in claim 1, wherein the polarization sensitive detector unit includes a polarizer disposed to select the selected polarization of the output beam from the second birefringent element.

12. (original) A birefringent interferometer as recited in claim 1, wherein the polarization sensitive detector unit includes a photodetector.

13. (original) A birefringent interferometer as recited in claim 12, wherein the polarization sensitive detector unit further includes a spectrometer disposed to disperse the selected polarization of the output beam before reaching the photodetector.

14. (original) A birefringent interferometer as recited in claim 12, wherein the polarization sensitive detection unit includes a light dispersing unit to disperse light received from the second birefringent element and the photodetector is a multiple channel photodetector disposed to detect multiple wavelengths of light dispersed by the light dispersion unit.

15-17 (canceled)

18. (original) A birefringent interferometer as recited in claim 1, wherein the first and second polarized beams are spatially separated by the first birefringent element so that the first polarized beam does not overlap the second polarized beam between the first and second birefringent elements.

19. (previously presented) A birefringent interferometer as recited in claim 1, wherein the first and second birefringent elements are separated along a direction parallel to a propagation direction of first and second polarized beams so as to leave a gap between the first and second birefringent elements.

20. (currently amended) An interferometer, comprising:

birefringent polarization beam splitting means for splitting an incoming polarized light beam into first and second light beams of orthogonal polarization;

birefringent polarization beam combining means for combining the first and second light beams of orthogonal polarization into an output beam, polarization states of the first and second light beams being maintained between the polarization beam splitting means and the polarization combining means;

polarization sensitive detection means for detecting polarization of the output beam; and

wavelength selection means for selecting a wavelength of light detected by the polarization sensitive detection means.

21. (original) An interferometer as recited in claim 20, further comprising polarized light emitting means for emitting a polarized light beam as an input to the polarization splitting means.

22. (previously presented) A polarization interferometer, comprising:

a birefringent beam splitter having an input path and first and second output paths;

a birefringent beam combiner having first and second input paths and an output path, the first and second input paths of the birefringent beam combiner aligned respectively with the first and second output paths of the birefringent beam splitter, polarization states of light propagating along the first and second output paths respectively from the birefringent beamsplitter to the birefringent beam combiner remaining unchanged between the birefringent beamsplitter and the birefringent beam combiner; and

a polarization sensitive detector disposed on the output path of the birefringent beam combiner.

23. (original) A polarization interferometer as recited in claim 22, further comprising a polarized light source that transmits a polarized light beam along the input path of the birefringent beam splitter.

24. (original) A polarization interferometer as recited in claim 23, wherein the polarized light source includes a generator of a polarized light beam.

25. (original) A polarization interferometer as recited in claim 23, wherein the polarized light source includes a generator of an unpolarized light beam on the input path to the birefringent beam splitter and a polarizer positioned on the unpolarized light beam between the generator and the birefringent beam splitter.

26. (original) A polarization interferometer as recited in claim 23, wherein the polarized light source is a tunable light source and further comprising a controller to control an operational wavelength of the tunable light source.

27. (original) A polarization interferometer as recited in claim 22, wherein the polarization sensitive detector includes a photodetector disposed on the output path from the birefringent beam combiner and a polarizer disposed on the output beam path from the birefringent beam combiner between the birefringent beam combiner and the photodetector.

28. (original) A polarization interferometer as recited in claim 27, wherein the polarization sensitive detector further includes a light dispersing unit disposed between the birefringent beam combiner and the photodetector.

29. (original) A polarization interferometer as recited in claim 28, wherein the light dispersing unit includes a movable dispersing element, and further comprising a controller coupled to the light dispersing unit to control a position of the moveable dispersing element.

30. (original) A polarization interferometer as recited in claim 29, further comprising an interface unit connected to the controller and couplable to a computer, the controller capable of operating under control instructions received from a computer coupled via the interface unit.

31. (original) A polarization interferometer as recited in claim 28, wherein the photodetector is a multiple channel photodetector disposed to detect multiple wavelengths of light dispersed by the light dispersing unit.

32. (original) A polarization interferometer as recited in claim 22, further comprising a data analysis unit coupled to the polarization sensitive detector to analyze an output signal from the polarization sensitive detector.

33. (original) A polarization interferometer as recited in claim 32, further comprising a data display unit coupled to the data analysis unit to display data analyzed by the data analysis unit.

34. (original) A polarization interferometer as recited in claim 32, further comprising an interface coupled to the data analysis unit to interface to a computer.

35. (previously presented) A polarization interferometer as recited in claim 22, wherein light propagating along the first output path from the birefringent beam splitter is an ordinary ray in the birefringent beam splitter and an extraordinary ray in the birefringent beam combiner and light propagating along the second output path from the birefringent beam splitter is an extraordinary ray in the birefringent beam splitter and an ordinary ray in the birefringent beam combiner.

36. (previously presented) A polarization interferometer as recited in claim 22, wherein light propagating along the first output path from the birefringent beam splitter is an extraordinary ray in the birefringent beam splitter and an extraordinary ray in the birefringent beam combiner and light propagating along the second output path from the birefringent beam splitter is an ordinary ray in the birefringent beam splitter and an ordinary ray in the birefringent beam combiner.

37. (new) A polarization interferometer as recited in claim 22, wherein the birefringent beam splitter and the birefringent beam combiner each comprise a single birefringent crystal.